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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,842	01/18/2002	Charles David Cooper	KSC-12209-1	9509

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EXAMINER

CHIN, BRADY

ART UNIT	PAPER NUMBER
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1744

DATE MAILED: 03/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/056,842

Applicant(s)

COOPER ET AL.

Examiner

Brad Y. Chin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-26 and 36-41 is/are allowed.
- 6) ☒ Claim(s) 27-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/18/2002</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

In the specification, on page 2, lines 22 and 23, Applicant should amend the "hand" symbol after "377" and "827" with the proper symbol -- 377°C and 827°C, respectively.

In the specification, on page 11, line 2, Applicant should change "light?s" to "light's".

Appropriate correction is required.

Claim Objections

2. Claim 1-26 are objected to because of the following informalities:

In claims 1, 15, and 21, on lines 2 and 4, remove the word, "and".

In claim 1, line 6; claim 15, line 6; and claim 21, line 6, add the conjunction, "and".

In claim 13, line 2; claim 27, line 3; and claim 40, line 2, add the article, "a" preceding "flue gas".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 27-31 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Duffey et. al. [U.S. Patent No. 5,129,212].

Regarding claim 27, Duffey teaches a treatment injector, the treatment injector comprising: an injector housing (tunnel 122; See Figure 12) having an inlet (See Figure 12; See Specification, col. 10, lines 54-58 – plurality of tubing 151 positioned in spaced tunnel spouts 152), an outlet (See Figure 12; See Specification, col. 10, lines 54-58 – plurality of tubing 151 positioned in spaced tunnel spouts 152), and a hollow interior extending therebetween (See Figure 12; sterilizing chamber 146 and interior space extending between inlets and outlets of tunnel 122), the inlet being connected in fluid communication with the source of hydrogen peroxide so that hydrogen peroxide flows through the hollow interior and toward the outlet (See Figure 12; See Specification, col. 10, lines 54-58 – suitable source (not shown) of heated gaseous hydrogen peroxide introduced and removed by tubing 151 in a plurality of spaced tunnel spouts 152); and at least one ultraviolet (UV) lamp positioned within the hollow interior of the injector (See Specification, col. 10, lines 50-64 – plurality of ultraviolet lamps 148 positioned within the hollow interior of tunnel 122 couples with gaseous hydrogen peroxide in chamber 146 serving to enhance sterilizing by reducing significantly the kill time).

Regarding claim 28, Duffey teaches the treatment injector according to claim 27 further comprising an air source connected in fluid communication with the inlet of the injector housing (See Figure 12; See Specification, col. 10, lines 59-61 – endmost tunnel spouts 152 allow introduction of pressurized and sterilize air).

Regarding claim 29, Duffey teaches the treatment injector according to claim 27 further comprising a heater carried by said housing (See Specification, col. 11, lines 19-24 – The caps and spouts are heated in the sterilizing assembly by the heaters in the chamber 26a).

Regarding claim 30, Duffey teaches the treatment injector according to claim 27 wherein the injector housing has a generally tubular shape (elongated tunnel 122; See Figure 12).

Regarding claim 31, Duffey teaches the treatment injector according to claim 27 wherein the at least one UV lamp has an elongate shape and is oriented generally parallel to the tubular shape of the injector housing (See Specification, col. 10, lines 47-49 – extending along each side wall of the tunnel 122 is a plurality of ultraviolet lamps generally designated by reference character 148).

Regarding claim 35, Duffey teaches the treatment injector according to claim 27 further comprising at least one cooling fan associated with the at least one UV lamp (See Specification, col. 11, lines 29-31 – plurality of fans 155 (one of which is shown) are mounted through suitable fittings for operation in the chamber 146).

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duffey et. al.

Duffey teaches the treatment injector according to claim 27 as identified above in paragraph 3. Duffey fails to teach that the at least one UV lamp is oriented transverse to the tubular shape of the injector housing.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the orientation of the UV lamps in the injector housing of Duffey from a generally parallel orientation to a transverse orientation as a matter of engineering design choice because orienting the UV lamps transverse to the elongated tubular shape of the injector housing would allow for positioning multiple UV lamps along the pathway of the injector housing and across the flow of hydrogen peroxide from the inlet to the outlet of the injector housing, providing a higher probability of contact between the gaseous hydrogen peroxide and the UV lamps and resulting in a higher concentration of dissociated hydrogen peroxide for treatment of pollutants in the flow of gas.

5. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duffey et. al. in view of Hoegler [U.S. Patent No. 5,68,193].

Duffey teaches the treatment injector according to claim 27 as identified above in paragraph 3. Duffey fails to teach that the treatment injector further comprises a UV reflective coating on an interior of the injector housing. Hoegler teaches that reflective coatings, which reflect both visible light radiation and infrared radiation, have been used on various types of lamps for years (See Specification, col. 1, lines 14-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the interior of the treatment injector with a UV reflective coating, such as that identified in Hoegler, because the reflective coating would direct more ultraviolet light radiation

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to react with the gaseous hydrogen peroxide as it flows through the interior of the injector housing and across the ultraviolet lamp, providing a higher concentration of disassociated hydrogen peroxide for sterilization.

6. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duffey et. al., as applied to claim 27, and further in view of Izumi et. al. [U.S. Patent No. 4,009,252].

Duffey teaches the treatment injector according to claim 27 as identified above in paragraph 3. Duffey fails to teach that the treatment injector further comprises a boric acid coating on an interior of the injector housing. Izumi teaches that adding boric acid to a reaction system inhibits the decomposition of hydrogen peroxide (See Specification, col. 1, lines 33-39).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Duffey's treatment injector with a boric acid coating because the boric acid coating would have prevented the decomposition of hydrogen peroxide as it passed through the injector housing, allowing a higher concentration of hydrogen peroxide to react with the ultraviolet light radiation and providing a higher concentration of dissociated hydrogen peroxide for sterilization.

Allowable Subject Matter

7. Claims 1-26 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Applicant's claims, 1-26, include the limitations for an apparatus for treating pollutants in a gas, where the apparatus comprises a gas flow tube carrying a flow of gas and comprising a sidewall having an opening therein; a source of hydrogen peroxide; and a treatment injector connected to the opening in the sidewall of the gas flow tube. The treatment injector comprises an injector

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housing having an inlet, outlet, and a hollow interior extending therebetween. The inlet of the injector housing is connected in fluid communication with the source of hydrogen peroxide so that the hydrogen peroxide flows through the hollow interior toward the outlet, where a UV lamp is positioned within the hollow interior of the injector housing for dissociating hydrogen peroxide and injecting the dissociated hydrogen peroxide into the flow of gas for treating pollutants.

DeLoach [U.S. Patent No. 5,256,379] teaches an apparatus and method for removing pollutants in a contaminated flowstream in the presence of an atomized reagent, such as hydrogen peroxide, where the contaminated flowstream and hydrogen peroxide mixture is further treated with ultraviolet light. DeLoach fails to teach that the hydrogen peroxide is reacted with the ultraviolet light in an apparatus prior to being injected into the contaminated airstream. Takahashi [U.S. Patent No. 4,344,918] discloses an apparatus and method that uses the reaction between hydrogen peroxide, which is fed into a reactor containing a contaminated liquid, and ultraviolet radiation, which is produced by a mercury vapor lamp immersed in the reactor, to create the hydroxyl free radical, $\cdot\text{OH}$. Takahashi fails to teach the injector housing where the hydrogen peroxide is fed into the inlet to react with the ultraviolet radiation, producing the hydroxyl free radical, $\cdot\text{OH}$, which is then forced out the outlet of the injector housing and into the gas flow tube. None of the references teach the claimed limitations nor would it have been obvious to combine references to achieve the claimed inventive subject matter.

8. Claims 36-41 are allowed.

The following is an examiner's statement of reasons for allowance: Claims 36-41 include the limitations for a method for treating pollutants in a flow of gas carried by a gas flow tube using a hydrogen peroxide source, where the method comprises: coupling a treatment injector between the hydrogen peroxide source and the gas flow tube, the treatment injector comprising

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an inlet, an outlet, and a hollow interior extending therebetween, the inlet being connected in fluid communication with the source of hydrogen peroxide, the treatment injector further comprising at least one ultraviolet (UV) lamp positioned within the hollow interior of the injector housing; and flowing hydrogen peroxide through the hollow interior of the injector housing and toward the outlet while operating the at least one UV lamp to dissociate hydrogen peroxide so that dissociated hydrogen peroxide is injected into the flow of gas from the outlet for treating pollutants in the flow of gas.

As identified above in paragraph 6, DeLoach teaches an apparatus and method for removing pollutants in a contaminated flowstream in the presence of an atomized reagent, such as hydrogen peroxide, where the contaminated flowstream and hydrogen peroxide mixture is further treated with ultraviolet light. However, DeLoach's method fails to teach that the treatment injector is coupled between the source of hydrogen peroxide and the gas flow tube and provides for a flow of hydrogen peroxide through the hollow interior of the injector housing and toward the outlet while operating the at least one UV lamp to dissociate hydrogen peroxide for treating pollutants in the flow of gas. Takahashi teaches an apparatus and method that uses the reaction between hydrogen peroxide, which is fed into a reactor containing a contaminated liquid, and ultraviolet radiation, which is produced by a mercury vapor lamp immersed in the reactor, to create the hydroxyl free radical, $\cdot\text{OH}$. However, Takahashi fails to teach Applicant's method of coupling the injector housing between the source of hydrogen peroxide and the gas flow tube and of flowing hydrogen peroxide through the hollow interior to dissociate hydrogen peroxide prior and injecting such dissociated hydrogen peroxide into the gas flow tube to treat pollutants in the flow of gas.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the

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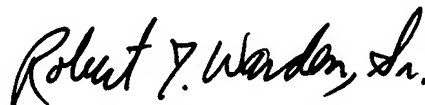
issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brad Y. Chin whose telephone number is 571-272-2071. The examiner can normally be reached on Monday – Friday, 8:00 A.M. – 5:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sun (John) Kim, can be reached at 571-272-1142. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

byc
March 14, 2005



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